

# ENVIRON

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May 30, 1996

## FEDERAL EXPRESS

Mr. Christopher J. Corbett, RPM  
Central Pennsylvania Section  
Hazardous Waste Management Division  
USEPA, Region III (3HW24)  
841 Chestnut Building  
Philadelphia, PA 19107

Re: Request for Explanation of Significant Differences (ESD) to the Remedy for Vault  
Soils, Operable Unit Four, Whitmoyer Laboratories Superfund Site

Dear Mr. Corbett:

In the December 17, 1990 *Record of Decision* (ROD) for the Whitmoyer Laboratories Superfund Site, the selected remedy for "upper vault wastes" (UVW) is bulk excavation, followed by the following treatment steps:

- on-site incineration in the presence of cement/pozzolan fixative agents (to inhibit arsenic volatilization during incineration);
- fixation of incineration residuals using a cement/pozzolan-based process or another similar fixation process that provides equivalent protection; and
- off-site disposal of the treated residuals.

During implementation of the USEPA-approved Remedial Design (RD) Work Plan, following issuance of the ROD, WLPSG excavated the UVW from the vault and segregated the wastes into three treatability groups: (1) soil, (2) carbon/tar mixture, and (3) tar. The characterization results for the wastes in these treatability groups were provided to USEPA in the July 29, 1994 *Vault Wastes Characterization Results Report* (Characterization Results Report). After segregation of the UVW, WLPSG was able to identify off-site RCRA Subtitle C incineration facilities that could incinerate the wastes in the carbon/tar and tar treatability groups within a reasonable period. Therefore, WLPSG requested that USEPA allow off-site incineration of these wastes. USEPA accepted WLPSG's request, and issued an ESD on June 8, 1995 to allow these wastes to be incinerated off-site. In early 1996, WLPSG began incineration of the wastes in the tar group at the Rollins facility at Aragonite, Utah and is continuing the RD for transportation of the wastes in the carbon/tar group for incineration at the same facility (expected to be conducted during late 1996 and 1997).

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For the remaining UVW treatability group, which consists of approximately 1,400 yd<sup>3</sup> of arsenic-contaminated vault soils, WLPSG has also identified an alternative to the ROD-specified remedy of on-site incineration. Based on new information developed during the RD, including additional characterization of the vault soils and extensive bench-scale treatability testing conducted during 1995, WLPSG believes that off-site chemical fixation and disposal of the vault soils at a Subtitle C facility is an appropriate alternative to on-site incineration and, therefore, requests an ESD to allow this alternate remedy.

The rationale for WLPSG's identification of fixation as an appropriate treatment technology for the vault soils, and its identification of appropriate treatment levels are discussed below, along with an evaluation of fixation vis-a-vis the remedy selection criteria specified in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (as amended) ("NCP").

#### Characterization of Vault Soils

As discussed in detail in the Characterization Results Report, the upper vault soils contain primarily arsenic (and relatively low concentrations of organic compounds) such that wastes in this treatability group are much more similar to the Lower Vault Wastes (LVW, which also contain primarily arsenic) than to the UVW carbon/tar and tar groups (which contain large concentrations of organic compounds). This comparison is shown below.

Waste Group	Arsenic Concentration (average %)	Aniline Concentration (average %)
Vault Soil	9	0.2
LVW	20	0.1*
Carbon/Tar	11	10
Tar	10	10

\* maximum concentration

Because of the vault soils' chemical similarity to the LVW, for which WLPSG demonstrated that chemical fixation provides effective treatment, and because fixation of the soils was not evaluated in the FS, WLPSG undertook a series of bench-scale tests to evaluate the effectiveness of fixation. The results of these treatability tests are summarized below, and provided in Attachment A.

As shown in the Characterization Result Report, the vault soils exhibit only the D004 (arsenic) characteristic. Therefore, the only potentially applicable Land Disposal Restrictions (LDR) treatment standard for the soils is arsenic at 5 mg/L as a constituent concentration in waste extract (CCWE) (40 CFR Part 268). Although organic constituents were detected at low levels in the soils, no applicable treatment standards exist for these constituents under current regulations. Additionally, for soils that are subject to LDR treatment standards, compliance with an LDR treatment standard can be achieved by using a treatability variance, as explained in USEPA's Superfund LDR Guide #6A (see Attachment B). According to USEPA,

*Superfund site managers (OSCs, RPMs) should seek a Treatability Variance to comply with the LDRs when managing restricted soil and debris wastes ... because the LDR treatment standards are based on treating less complex matrices of industrial process wastes.... (p. 2)*

Under a treatability variance, an alternate treatment level for soil with arsenic concentrations greater than 10 mg/kg would be the achievement of greater than 90% reduction in TCLP-arsenic concentration.

#### Fixation Treatability Test Results

For the vault soils, the aim of WLPSG's bench-scale fixation treatability tests conducted to date was to identify a formulation that could feasibly and consistently achieve the 5 mg/L arsenic LDR treatment standard for D004 wastes. The investigation began with the chemical formulation that WLPSG had demonstrated, after extensive bench-scale tests, to be successful in treating the arsenic in the LVW to meet a 5 mg/L LDR treatment standard. However, when applied to vault soils, that formulation (and several other variations of the formulation) were unable to achieve the 5 mg/L LDR treatment standard, although virtually all of the formulations tested were able to achieve greater (in some cases substantially greater) than 90% reduction in the TCLP-arsenic concentration (see Attachment A). The treatability test data for the vault soils indicate that the formulations also substantially reduced the TCLP-aniline concentration (i.e., greater than approximately 88%). It should be emphasized, however, that there is no LDR treatment standard for aniline and thus an alternate treatment level under a treatability variance is not required for aniline.

Based on the results from its treatability tests, WLPSG believes that fixation of the soils can comply with the applicable LDR treatment standard for arsenic through the use of a treatability variance. The fixation formulation identified through WLPSG's extensive testing can consistently and feasibly reduce TCLP-arsenic concentrations by more than 90% and can also result in substantial reductions in TCLP-aniline. An evaluation of off-site fixation via-a-vis the remedy selection criteria specified in the NCP is presented below to support WLPSG's conclusion that off-site fixation is an appropriate alternative to the ROD-specified remedy of on-site incineration of the vault soils.

#### Evaluation of the NCP Remedy Selection Criteria

**Overall Protection of Human Health and the Environment.** Both the ROD-specified remedy and the proposed alternative of off-site fixation rely on immobilization of the arsenic to protect human health and the environment, and do not result in the destruction of arsenic, the principal hazardous constituent of the soils.

The concentrations and/or mobility of the relatively minor organic constituents of the soils are expected to be reduced by the chemical additions necessary during fixation of the soils. Chemical conversion (e.g., oxidation) and physical depletion (e.g., volatilization) during fixation of the arsenic may also reduce the concentration of the organic constituents. Although the relatively minor organic constituents of the soils may not be destroyed as they would be in incineration, the relatively low concentrations of these constituents remaining after fixation and disposal of the vault soils would be expected to present insignificant risk to human health and the environment.

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Additionally, WLPSG will dispose the fixated soils at a Subtitle C landfill constructed with liners and leachate collection systems. As a result, off-site fixation of soils and disposal of fixated soils at a Subtitle C facility would provide protection of human health and the environment by 1) immobilizing arsenic, the principal hazardous constituent in the soil, and other constituents of the soils, and 2) significantly reducing the potential for exposure to the treated soils. In addition, off-site fixation of the soils would eliminate potential exposures from potentially hazardous emissions that may occur during on-site incineration of the soils, thus providing to the community around the Whitmoyer Site a greater level of overall protection than that provided by the ROD-specified remedy.

*Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).* Off-site fixation of the vault soils would comply with LDR treatment requirements (with the use of a treatability variance as discussed above), and all other applicable state and federal ARARs.

*Long-term Effectiveness and Permanence.* The long-term effectiveness of off-site fixation with disposal in a Subtitle C landfill would be similar to that for on-site incineration, since both alternatives would rely on immobilization and engineering controls to minimize potential exposure to arsenic. Although incineration would enhance long-term effectiveness and permanence through destruction of organics, fixation has also been shown to reduce the mobility and the concentration of organics in the vault soils.

*Reduction of Toxicity, Mobility, or Volume Through Treatment.* The ROD-specified remedy (on-site incineration) may slightly decrease the toxicity of the wastes by physically altering the organics in the soil. However, incineration would not reduce the toxicity or volume of the principal hazardous constituent (arsenic), and could potentially mobilize arsenic into the environment through stack emissions. According to the ROD remedy, vault wastes would be incinerated in the presence of cement/pozzolan fixative agent(s) to inhibit arsenic volatilization during the thermal treatment step. Given the low organic content of the vault soils, any reduction in the volume of soil by incineration would be more than off-set by the addition of these fixative agents. Furthermore, fixation of the incineration residuals using a cement/pozzolan-based process, or another similar fixation process that provides equivalent protection, would further increase the final volume of treated soils.

Off-site fixation would virtually eliminate any potential for arsenic to be mobilized into the environment because arsenic mobility would be reduced by 90% or more and the fixated soils would be disposed in a Subtitle C landfill with liners and leachate collection systems. Additionally, the concentration and/or mobility of organics in the soil, such as aniline, are also expected to be significantly reduced through the fixation process. The addition of fixative agents to the soils would increase the soil volume; however, this increase is expected to be comparable to the volume increase resulting from on-site incineration and off-site fixation/disposal.

**Short-term Effectiveness.** Fixation of soils would eliminate the potential short-term risk to the community around the Whitmoyer Site associated with arsenic volatilization during on-site incineration. The period of time needed to complete fixation of the soils is expected to be much shorter than the time needed to complete on-site incineration; WLPSG has identified at least two facilities that can accept and treat the soils, which decreases the amount of time needed to complete the remedy.

Off-site transportation under either alternative would be conducted in accordance with all ARARs. Under these requirements, transportation risks would be very low for both alternatives.

**Implementability.** WLPSG has identified adequate off-site fixation and disposal capacity for the soils and at least two facilities that can accept and treat the soils. For the on-site incineration remedy, a facility would need to be designed, constructed, and tested to ensure it would not pose an unacceptable risk to the off-site community.

**Cost.** The present-worth cost for fixation of the soils is expected to be significantly lower than that for on-site incineration and fixation of the incineration residuals.

**State Acceptance.** The Commonwealth of Pennsylvania did not concur with the selection of the on-site incineration remedy, and is expected to concur with this request for a change in treatment technology based on the State's acceptance of two previous ESD requests (for LVW, and the carbon/tar and tar treatability groups) to change the remedy from on-site treatment to off-site treatment.

**Community Acceptance.** Community concerns have been raised regarding the safety of on-site incineration. Similar concerns are not expected with regard to off-site fixation. The community is expected to concur with this request for a change in treatment technology based on community acceptance of two previous ESD requests to change the remedy from on-site to off-site treatment.

In summary, WLPSG believes that new information developed during its RD work demonstrates that fixation of the soils would meet the NCP's threshold criteria for remedy selection and, on balancing the other NCP criteria, would be a more appropriate remedy for the soils than on-site incineration. As such, WLPSG requests that USEPA issue an ESD to allow off-site fixation of the soils, and grant a treatability variance to allow off-site disposal of the treated vault soils to be in compliance with the LDR treatment standards. To avoid any delay in completing the remedial action for OU Four, WLPSG is proceeding with the RD of the remedy for the soils on the basis of off-site fixation.

Mr. Christopher J. Corbett, RPM

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May 30, 1996

Please contact either of us at your convenience if you have any questions or comments.

Sincerely,

On Behalf of the Whitmoyer Laboratories Private Study Group

Stephen T. Washburn  
Principal



Kim Cizerle  
OU Four Coordinator

STW/KC:rdp  
02-1736C.525:WPL709\_1.WPD

**Attachments**

cc: D. Brayack, HNUS  
J. Bryson, ENVIRON  
P. Cichy, Rohm and Haas  
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## **ATTACHMENT A**

### **Results of Bench-Scale Treatability Tests**

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## **ATTACHMENT A**

The remedies selected for vault wastes in the December 17, 1990 *Record of Decision* (ROD) are: (1) incineration followed by chemical stabilization for the Upper Vault Wastes (UVW); and (2) fixation for the Lower Vault Wastes (LVW). Although soils were located in the upper portion of the vault, the levels of organic and inorganic constituents in the vault soils were found to be more similar to those of the lower vault sludge during the pre-design segregation and characterization of the various vault wastes. Thus, WLPSG has pursued fixation of the vault soils.

Because USEPA did not evaluate fixation as a remedial alternative for the upper vault soils in the Feasibility Study (FS), WLPSG conducted a series of treatability tests during 1995 to determine whether fixation would be a feasible remedy for the soils. WLPSG selected Chemical Waste Management (CWM), US Ecology (ECOL), Kiber Environmental Services, Inc. (Kiber), and the Environmental Quality Company (EQ) to perform a series of bench-scale tests in accordance with WLPSG's December 19, 1994 letter to USEPA. The results from these tests are provided herein. As discussed below, these results demonstrate that fixation can comply with the applicable LDR treatment standards through the use of a treatability variance, and can reduce the concentrations and/or mobility of other constituents of the soil, including aniline.

### **Treatability Variance Background Information**

As shown in the July 29, 1994 *Vault Wastes Characterization Results Report* (Characterization Results Report), the soils exhibit only the D004 (arsenic) characteristic. Therefore, the only potentially applicable LDR treatment standard for the soils is arsenic at 5 mg/L as a CCWE (40 CFR Part 268). Although organic constituents were detected in the soils, no applicable treatment standards exist for these constituents under current regulations. Additionally, for soil that is subject to LDR treatment standards, compliance with an LDR treatment standard can be achieved by using a treatability variance, as explained in USEPA's Superfund LDR Guide #6A (see Attachment B). According to USEPA,

*Superfund site managers (OSCs, RPMs) should seek a Treatability Variance to comply with the LDRs when managing restricted soil and debris wastes ... because the LDR treatment standards are based on treating less complex matrices of industrial process wastes.... (p. 2)*

Under a treatability variance, an alternate treatment level for soil with arsenic concentrations greater than 10 mg/kg would be achievement of reduction in TCLP-arsenic concentration of greater than 90%.

**Results of Bench-Scale Treatability Studies**

The bench-scale treatability results for TCLP-arsenic, and total and TCLP-aniline are presented in Table 1 and Table 2, respectively.

The following is a brief summary of the testing that was conducted and the major conclusions:

- The mix designs used for vault soil treatment were similar to those used during the calcium-arsenic sludge treatability studies, including the final LVW mix design. These designs typically included the use of an oxidizer (sodium persulfate) to oxidize arsenite and organo-arsenic species to inorganic arsenate, followed by the use of a precipitant (ferric sulfate) to form ferric or calcium arsenate, and Portland Cement to stabilize the mixture.
- CWM, ECOL, and Kiber performed treatability tests per the protocol outlined in WLPSG's December 19 letter to USEPA. Initial tests demonstrated that, although TCLP-arsenic concentrations were consistently reduced by greater than 90% (except for one CWM formulation that did not use the precipitant or Portland Cement), none of the formulations were able to achieve a TCLP-arsenic concentration of 5 mg/L. Each treatment contractor performed additional treatability tests with various formulations and consistently reduced TCLP-arsenic concentrations by greater than 90%, but TCLP-arsenic concentrations remained above 5 mg/L.
- EQ performed treatability tests using formulations that included a proprietary reagent; again, TCLP-arsenic concentrations were consistently reduced by greater than 90%, but the formulations were unable to achieve a TCLP-arsenic concentration below 5 mg/L.

- Although a formulation that could achieve the LDR treatment standard of 5 mg/L was not identified, virtually all formulations achieved a reduction in TCLP-arsenic concentration greater than 90%. A 90% reduction in TCLP-arsenic concentration is consistent with the alternative treatment standard cited in the Superfund LDR Guide #6A (second edition).
- In general, compared to a 4-hour cure-time, a cure-time of 48 hours caused a slight increase in TCLP-arsenic concentration (i.e., a slight decrease in arsenic reduction). However, even after a cure-time of 48 hours, greater than 90% reduction in TCLP-arsenic was consistently achieved.
- Kiber performed total and TCLP aniline analyses on untreated and treated samples (as well as on an untreated and treated sample that was spiked with aniline) to evaluate the effect of the TCLP and fixation on aniline concentrations. Results indicate that the TCLP and fixation each significantly reduces the TCLP-aniline concentrations, and that TCLP-aniline concentrations for the fixated soils (both the unspiked and spiked) were less than 1 ppm.

In summary, the formulation used to treat the LVW and several variations of the formulation were unable to achieve the 5 mg/L LDR treatment standard, although virtually all of the formulations tested were able to achieve greater (in some cases substantially greater) than 90% reduction in the TCLP-arsenic concentration. Based on the results from its treatability tests, WLPSG believes that fixation of the soils can comply with the applicable LDR treatment standard for arsenic through the use of a treatability variance.

The treatability test data also indicate that the formulations tested also resulted in substantial reductions in the TCLP-aniline concentration (i.e., greater than approximately 88%). However, aniline does not have an LDR treatment standard and, therefore, does not need an alternate treatment level under a treatability variance; WLPSG has qualitatively evaluated aniline reduction because USEPA requested the evaluation.

Based on the capabilities of the contractors, and the willingness of the states in which they are located to receive out-of-state wastes for treatment with a treatability variance (see Attachment C), WLPSG has concluded that it will continue to evaluate only the ECOL and CWM treatment facilities by means of large-scale demonstration tests. The purpose of these large scale demonstration tests will be to ensure the feasibility of consistently reducing TCLP-arsenic concentrations by greater than 90% during full-scale treatment of vault soils.

Table 1. Upper Vault Soils Bench-Scale Fixation Test Results  
Whitmoyer Laboratories Superfund Site - OU Four

Testing Facility	Formulation (% of soil wt.)					TCLP-Aa				
	$\text{Na}_2\text{S}_2\text{O}_8$	$\text{Fe}(\text{SO}_4)_2$	PC	Line	EQ Reagent	Untreated (mg/l)	4-Hr (mg/l)	% Reduction	24-Hr (mg/l)	% Reduction
CWA, Enfield	Untreated	—	—	—	—	2,316	—	—	—	—
	15	100	50	—	—	—	10	99.6	—	99.2
	N/A	100	20	50	—	—	61	97.4	—	88.8
	N/A	100	50	—	—	—	220	90.5	—	88.7
	15	—	—	50	—	—	284 <sup>1</sup>	87.7	—	—
	25	100	50	—	—	—	5.7	99.8	—	—
	25	100	60	—	—	—	37	98.4	—	—
	15	100	50	—	—	—	172	92.6	—	—
	30	100	40	—	—	—	9.4	99.6	—	—
	30	90	50	—	—	—	5.4	99.8	—	—
US Ecology, Beatty	Untreated	—	—	—	—	3,846	—	—	—	—
	15	100	50	—	—	—	5.3	99.9	—	99.8
	15	100	50	—	—	—	6.2	99.8	—	99.8
	—	100	50	—	—	—	22	99.4	—	98.9
	—	100	50	—	—	—	28	99.3	—	98.6
	20	100	50	—	—	—	25	99.4	—	—
	20	125	50	—	—	—	31	99.2	—	—
	—	125	50	—	—	—	33	99.1	—	—
	25	100	50	—	—	—	6.6 <sup>2</sup>	99.8	—	—
	Untreated	—	—	—	—	2,200	—	—	—	—
K&R	Untreated	—	—	—	—	—	—	—	—	—
	15	100	50	—	—	—	19	99.1	—	—
	15	100	50	—	—	—	22	99.0	—	—
	25	100	50	—	—	—	8.2	99.6	—	99.7
	25	100	50	—	—	—	5.9	99.7	—	99.7
	25	100	50	—	—	—	6.5	99.7	—	—
	Untreated	—	—	—	—	2,300	—	—	—	—
	15	—	—	52	400	—	—	—	24	99.0
	9.9	—	—	53	315	—	—	—	560	75.7
	—	—	—	51	90	—	—	—	870	62.2
BQ	Untreated	—	—	—	—	—	—	—	—	—
	20	—	—	52	480	—	4.5	99.8	12	99.5
	20	—	—	54	480	—	160	93.0	—	—
	24	—	—	53	550	—	27	98.8	—	—
	26	—	—	52	575	—	19	99.2	—	—
	34	—	—	71	660	—	47	98.0	—	—
	21	—	—	—	610	—	40	98.3	—	—
	24	—	—	—	930	—	35	98.5	—	—
	Untreated	—	—	—	—	—	—	—	—	—
	15	—	—	—	—	—	—	—	—	—

Notes:

1: Formulation acidified with 15 ml 1N HCL.

2: Formulation with 1 hour peroxide reaction time.

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Table 2. Upper Vault Soils Bench-Scale Fixation Test Results  
Whitmoyer Laboratories Superfund Site - OU Four

Testing Facility	Formulation (% of soil wt.)				Aniline		
	Na <sub>2</sub> S <sub>2</sub> O <sub>4</sub>	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	PC	Lime	Total (ppm)	TCLP (ppm)	% Reduction
Kiber	Untreated	--	--	--	330	5	--
	15	100	50	--	--	0.51	89.8
	15	100	50	--	--	0.62	87.6
	Untreated	--	--	--	1,400*	74	--
	25	100	50	--	--	--	--
	25	100	50	--	28	0.51/0.41	99.3/99.4
Note: */" separates 4-hour and 48-hour cure data							
* indicates sample was spiked with aniline prior to TCLP analysis and treatment							

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## **ATTACHMENT B**

### **Superfund LDR Guide #6A**

**AR305062**



# Superfund LDR Guide #6A (2nd Edition) Obtaining a Soil and Debris Treatability Variance for Remedial Actions

Office of Emergency and Remedial Response  
Hazardous Site Control Division

Quick Reference Fact Sheet

The Office of Emergency and Remedial Response (OERR) issued a series of Superfund LDR Guides in July and December of 1989. This series included: *Overview of RCRA Land Disposal Restrictions (LDRs)* (Superfund LDR Guide #1); *Complying with the California List Restrictions* (Superfund LDR Guide #2); *Treatment Standards and Minimum Technology Requirements Under the LDRs* (Superfund LDR Guide #3); *Complying with the Hammer Restrictions Under the LDRs* (Superfund LDR Guide #4); *Determining When the LDRs are Applicable to CERCLA Responses* (Superfund LDR Guide #5); *Obtaining a Soil and Debris Treatability Variance for Remedial* (Superfund LDR Guide #6A) and *Removal* (Superfund LDR Guide #6B) *Actions*; and *Determining When the LDRs are Relevant and Appropriate to CERCLA Responses* (Superfund LDR Guide #7). Since the issuance of these guides, the Environmental Protection Agency, with cooperation from outside parties (e.g., environmental groups, industry representatives), has conducted an analysis of the potential impacts associated with applying the LDR treatment standards to Superfund and RCRA Corrective Action cleanups. As a result of these analyses, it was decided that the Agency will promulgate a third set of treatment standards (in addition to the wastewater and nonwastewater categories currently in effect) specifically for soil and debris wastes. In the interim, there is the presumption that CERCLA response actions involving the placement of soil and debris contaminated with RCRA restricted wastes will utilize a Treatability Variance to comply with the LDRs and that, under these variances, the treatment levels outlined in Superfund LDR Guide #6A will serve as alternative "treatment standards." This guide (a revision to the original Superfund LDR Guide #6A) has been prepared to outline the process for obtaining and complying with a Treatability Variance for soil and debris that are contaminated with RCRA hazardous wastes until such time that the Agency promulgates treatment standards for soil and debris.

## BASIS FOR A TREATABILITY VARIANCE

When promulgating the LDR treatment standards, the Agency recognized that treatment of wastes to the LDR treatment standards would not always be possible or appropriate. In addition, the Agency recognized the importance of ensuring that the LDRs do not unnecessarily restrict the development and use of alternative and innovative treatment technologies for remediating hazardous waste sites. Therefore, a Treatability Variance process (40 CFR §268.44) is available to comply with the LDRs when a Superfund waste differs significantly from the waste used to set the LDR treatment standard such that:

- The LDR standard cannot be met; or
- The best demonstrated available technology (BDAT) used to set the standard is inappropriate for the waste.

Superfund site managers (OSCs, RPMs) should seek a Treatability Variance to comply with the LDRs when managing restricted soil and debris

## Highlight 1: SOIL AND DEBRIS

**Soil.** Soil is defined as materials that are primarily of geologic origin such as sand, silt, loam, or clay, that are indigenous to the natural geologic environment at or near the CERCLA site. (In many cases, soil is mixed with liquids, sludges, and/or debris.)

**Debris.** Debris is defined as materials that are primarily non-geologic in origin, such as grass, trees, stumps, and man-made materials such as concrete, clothing, partially buried whole or empty drums, capacitors, and other synthetic manufactured materials, such as liners. (It does not include synthetic organic chemicals, but may include materials contaminated with these chemicals).

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wastes (see Highlight 1) because the LDR treatment standards are based on treating less complex matrices of industrial process wastes (except for the dioxin standards, which are based on treating contaminated soil). A Treatability Variance does not remove the requirement to treat restricted soil and debris wastes. Rather, under a Treatability Variance, alternate treatment levels based on data from actual treatment of soil, or best management practices for debris, become the "treatment standard" that must be met.

## COMPLYING WITH A TREATABILITY VARIANCE FOR SOIL AND DEBRIS WASTES

### Soil Wastes

Once site managers have identified the RCRA waste codes present at the site, the next step is to

identify the BDAT constituents of those RCRA waste codes and to divide these constituents into one of the structural/functional groups shown in column 1 of Highlight 2. After dividing the BDAT constituents into their respective structural/functional groups, the next step is to compare the concentration of each constituent with the threshold concentration (see column 3 of Highlight 2) and to select the appropriate concentration level or percent reduction range. If the concentration of the restricted constituent is less than the threshold concentration, the waste should be treated to within the concentration range. If the waste concentration is above the threshold, the waste should be treated to reduce the concentration of the waste to within the specified percent reduction range. Once the appropriate treatment range is selected, the third step is to identify and select a specific technology

**Highlight 2: ALTERNATE TREATABILITY VARIANCE LEVELS AND TECHNOLOGIES FOR STRUCTURAL/FUNCTIONAL GROUPS**

Structural Functional Groups	Concentration Range (ppm)	Threshold Concentration (ppm)	Percent Reduction Range	Technologies that achieved recommended effluent concentration guidance**
<b>ORGANICS</b>	<b>Total Waste Analysis/</b>	<b>Total Waste Analysis/</b>		
Halogenated Non-Polar Aromatics	0.5 - 10	100	90 - 99.9	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Dioxins	0.00001 - 0.05	0.5	90 - 99.9	Dechlorination, Soil Washing, Thermal Destruction
PCBs	0.1 - 10	100	90 - 99.9	Biological Treatment, Dechlorination, Soil Washing, Thermal Destruction
Herbicides	0.002 - 0.02	0.2	90 - 99.9	Thermal Destruction
Halogenated Phenols	0.5 - 40	400	90 - 99	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Halogenated Aliphatics	0.5 - 2	40	95 - 99.9	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Halogenated Cyclics	0.5 - 20	200	90 - 99.9	Thermal Destruction
Nitrated Aromatics	2.5 - 10	10,000	99.9 - 99.99	Biological Treatment, Soil Washing, Thermal Destruction
Heterocyclics	0.5 - 20	200	90 - 99.9	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Polynuclear Aromatics	0.5 - 20	400	95 - 99	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
Other Polar Organics	0.5 - 10	100	90 - 99	Biological Treatment, Low Temp. Stripping, Soil Washing, Thermal Destruction
<b>INORGANICS</b>	<b>TCLP</b>	<b>TCLP</b>		
Antimony	0.1 - 0.2	2	90 - 99	Immobilization
Arsenic	0.30 - 1	10	90 - 99.9	Immobilization, Soil Washing
Barium	0.1 - 40	400	90 - 99	Immobilization
Chromium	0.5 - 6	120	95 - 99.9	Immobilization, Soil Washing
Nickel	0.5 - 1	20	95 - 99.9	Immobilization, Soil Washing
Selenium	0.005	0.05	90 - 99	Immobilization
Vanadium	0.2 - 20	200	90 - 99	Immobilization
Cadmium	0.2 - 2	40	95 - 99.9	Immobilization, Soil Washing
Lead	0.1 - 3	300	99 - 99.9	Immobilization, Soil Washing
Mercury	0.0002 - 0.008	0.08	90 - 99	Immobilization

\* TCLP also may be used when evaluating waste with relatively low levels of organics that have been treated through an immobilization process.

\*\* Other technologies may be used if treatability studies or other information indicates that they can achieve the necessary concentration or percent-reduction range.

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that can achieve the necessary concentration or percent reduction. Column 5 of Highlight 2 lists technologies that (based on existing performance data) can attain the alternative Treatability Variance levels.

During the implementation of the selected treatment technology, periodic analysis using the appropriate testing procedure (i.e., total waste analysis for organics and TCLP for inorganics) will be required to ensure the alternate treatment levels for the BDAT constituents requiring control are being attained and thus can be land disposed without further treatment.

Because of the variable and uncertain characteristics associated with unexcavated wastes, from which only sampling data are available, treatment systems generally should be designed to achieve the more stringent end of the treatment range (e.g., 0.5 for chromium, see column 2 of Highlight 2) to ensure that the treatment residuals from the most contaminated portions of the waste fall below the "no exceedance" levels (e.g., 6.0 ppm for chromium). Should data indicate that the treatment levels set through the Treatability Variance are not being attained (i.e., treatment residuals are greater than the "no exceedance" level), site managers should consult with EPA Headquarters.

### Debris Wastes

Site managers should use the same process for obtaining a Treatability Variance described above for types of debris that are able to be treated to the alternate treatment levels (e.g., paper, plastic). However, for most types of debris (e.g., concrete, steel pipes), which generally cannot be treated, site managers should use best management practices. Depending on the specific characteristics of the debris, these practices may include decontamination (e.g., triple rinsing) or destruction.

### **OBTAINING A TREATABILITY VARIANCE FOR SOIL AND DEBRIS WASTES**

Once it is determined that a CERCLA waste is a soil or debris, and that compliance with the LDRs will be required (i.e., the wastes contain restricted RCRA waste(s) and placement will occur), site managers should initiate the process of obtaining a Variance. For remedial actions this will involve: (1) documenting the intent to comply with the LDRs through a Treatability Variance in the FS Report; (2) announcing the intent to comply through a Treatability Variance in the Proposed Plan; and (3) granting of the Treatability Variance by the Regional Administrator or the

### **HIGHLIGHT 3 - INFORMATION TO BE INCLUDED IN AN RI/FS TO DOCUMENT THE INTENT TO COMPLY WITH THE LDRs THROUGH A TREATABILITY VARIANCE FOR ON-SITE AND OFF-SITE CERCLA RESPONSE ACTIONS INVOLVING THE PLACEMENT OF SOIL AND DEBRIS CONTAMINATED WITH RESTRICTED RCRA WASTES**

#### ON-SITE

- Description of the soil or debris waste and the source of the contamination;
- Description of the Proposed Action (e.g., "excavation, treatment, and off-site disposal");
- Intent to comply with the LDRs through a Treatability Variance; and
- For each alternative using a Treatability Variance to comply, the specific treatment level range to be achieved (see Highlight 2 to determine these treatment levels).

#### OFF-SITE

For off-site Treatability Variances, the information above should be extracted from the RI/FS report and combined with the following information in a separate document:

- Petitioner's name and address and identification of an authorized contact person (if different); and
- Statement of petitioner's interest in obtaining a Treatability Variance.

\* This document may be prepared after the ROD is signed (and Treatability Variance granted) but will need to be compiled prior to the first shipment of wastes (or treatment residuals) to the receiving treatment or disposal facility.

Assistant Administrator/OSWER when the ROD is signed.

### FS Report

The FS Report should contain the necessary information (see Highlight 3) to document the intent to comply with the LDRs for soil and debris through a Treatability Variance. In the Detailed Analysis of Alternatives chapter of the FS Report, the discussion should specify the treatment level range(s) that the treatment technology would attain for each waste constituent restricted under the LDRs, as well as the Superfund primary contaminants of concern identified during the baseline risk assessment. In addition, under the Comparative Analysis of Alternatives section, when discussing the "Compliance with ARARs Criteria," site managers should indicate which alternatives will comply with the LDRs through the use of a Treatability Variance.

### Proposed Plan

The intent to comply with the LDRs through a Treatability Variance for a particular alternative should be clearly stated in the Description of Alternatives section of the Proposed Plan. Because the Proposed Plan solicits public comment on all of the alternatives and not just the preferred

### **Highlight 4 - SAMPLE LANGUAGE FOR THE PROPOSED PLAN**

#### Description of Alternatives section

*This alternative will comply with the LDRs through a Treatability Variance under 40 CFR 268.44. This Variance will result in the use of [specify technology] to attain the Agency's interim "treatment level/ranges" for the contaminated soil at the site (see Detailed Analysis of Alternatives Chapter of the FS Report for the specific treatment levels for each constituent). --*

#### Evaluation of Alternatives section, under "Compliance with ARARs"

*The LDRs are ARARs for [Enter number] of [Enter total number of alternatives] remedial alternatives being considered. [Enter number] of the [Enter total number of alternatives] alternatives would comply with the LDRs through a Treatability Variance.*

### **Highlight 5: SAMPLE LANGUAGE FOR A RECORD OF DECISION**

#### Description of Alternatives section:

*This alternative will comply with the LDRs through a Treatability Variance for the contaminated soil and debris. The treatment level range established through a Treatability Variance that [Enter technology] will attain for each constituent as determined by the indicated analyses are [Example shown below]:*

*Barium                    0.1 - 40 ppm (TCLP)*

*Mercury                0.0002 - 0.008 ppm (TCLP)*

*Vanadium              0.2 - 20 ppm (TCLP)*

*TCE                    95-99.9% reduction (TWA)*

*Cresols                90-99% reduction (TWA)*

option, the intent to obtain a Treatability Variance should be identified for every alternative for which a Variance would be used. This opportunity for public comment on the Proposed Plan fulfills the requirements for public notice and comment (off-site actions only) on the Treatability Variance as required in RCRA §268.44. Sample language for the Proposed Plan is provided in Highlight 4.

#### Record of Decision

A Treatability Variance is granted and becomes effective when the Record of Decision (ROD) is signed by the Regional Administrator or Assistant Administrator/OSWER. In the Description of Alternatives section, as part of the discussion of major applicable requirements associated with each remedial option, site managers should include a statement (as was done in the FS report) that a Treatability Variance will be used to comply with the LDRs, and list the treatment level range(s) that the selected technology will attain for each constituent. Sample language for the ROD is provided in Highlight 5.

In the Comparative Analysis section, under "Compliance with ARARs," site managers should indicate which of the alternatives will comply with the LDRs through a Treatability Variance. Under the Statutory Determination section (Compliance with ARARs), site managers should identify the

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LDRs as an ARAR and indicate that a Treatability Variance is being used to comply.

Under some circumstances, the need to obtain a Treatability Variance may not be evident until after a ROD is signed. For example, previously undiscovered evidence may be obtained during a remedial design/remedial action (RD/RA) that the CERCLA waste contains a RCRA restricted waste and the LDRs are then determined to be applicable. In such situations, a site manager would need to prepare an explanation of significant differences (ESD) from the ROD and make it available to the public to explain the need for a Treatability Variance. In addition, unlike other ESDs that do not require public comment under CERCLA section 117(c), if the ESD involves granting a Treatability Variance, an opportunity for public comment would be required to fulfill the public notice and comment requirements for a Treatability Variance under 40 CFR §268.44.

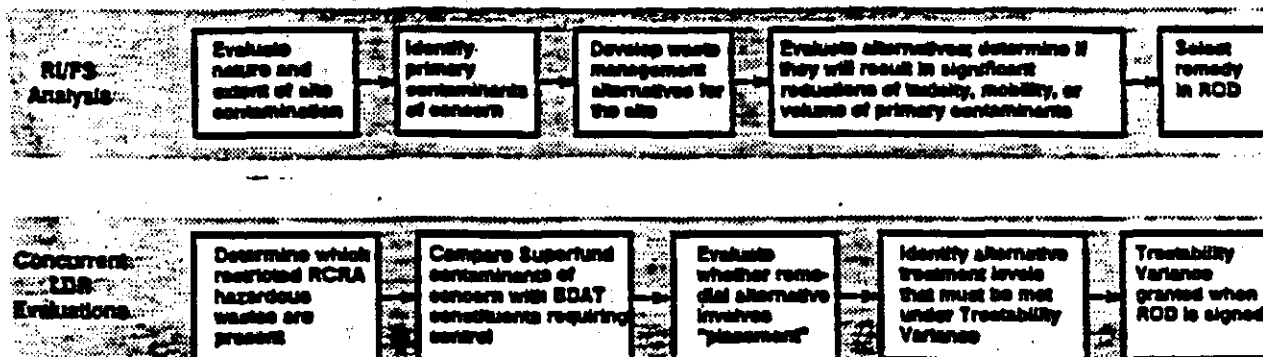
#### LDRs IN SUPERFUND ACTIONS

Because of the important role the LDRs may play in Superfund cleanups, site managers need to incorporate early in the RI/FS the necessary investigative and analytical procedures to determine if the LDRs are applicable for remedial alternatives that involve the "placement" of wastes.

When the LDRs are applicable, site managers should determine if the treatment processes associated with the alternatives can attain either the LDR treatment standards or the alternate levels that would be established under a Treatability Variance.

Site managers must first evaluate whether restricted RCRA waste codes are present at the site, identify the BDAT constituents requiring control, and compare the BDAT constituents with the Superfund primary constituents of concern from the baseline risk assessment. This process identifies all of the constituents for which remediation may be required. Once the viable alternatives are identified in the FS, site managers should evaluate those involving the treatment and placement of restricted RCRA hazardous wastes to ensure their respective technology process(es) will attain the appropriate treatment levels (i.e., either LDR treatment standard or Treatability Variance alternate treatment levels for soil and debris containing restricted RCRA hazardous wastes) and, in accordance with Superfund goals, reductions of 90 percent or greater for Superfund primary contaminants of concern. The results of these evaluations are documented in the Proposed Plan and ROD. An illustration of the integration of LDRs and Superfund is shown in Highlight 6. An example of the process for complying with a Treatability Variance for contaminated soil and debris is presented in Highlight 7.

Highlight 6: LDRs IN THE RI/FS PROCESS



### Highlight 7: IDENTIFICATION OF TREATMENT LEVELS FOR A TREATABILITY VARIANCE

As part of the RI, it has been determined that soils in one location at a site contain F006 wastes and creosols (which site records indicate were an F004 waste). Arsenic also was found in soils at a separate location. The baseline risk assessment identified cadmium, chromium, lead, and arsenic as primary contaminants of concern. The concentration range of all of the constituents found at the site included:

Constituent	Total Concentration (mg/kg)	TCLP (mg/l)	Constituent	Total Concentration (mg/kg)	TCLP (mg/l)
Cadmium	2,270 - 16,200	120 - 146	Nickel	100 - 140	1 - 6.5
Chromium	3,160 - 4,390	30 - 56	Silver	1 - 3	—
Cyanides	80 - 150	1 - 16	Creosols	50 - 600	.25 - 4
Lead	500 - 625	2 - 12.5	Arsenic	800 - 1,900	3 - 9

Four remedial alternatives are being considered: (1) Low temperature thermal stripping of soil contaminated with creosols followed by immobilization of the ash; (2) Immobilization of the soil in a mobile unit; (3) In-situ immobilization; and (4) Capping of wastes. Each of these alternatives must be evaluated to determine if they will result in significant reduction of the toxicity, mobility, or volume of the waste; whether "placement" occurs; and, if "placement" occurs, whether the treatment will attain the alternative treatment levels established through a Treatability Variance for the BDAT constituents requiring control.

#### STEP 1: IDENTIFY THE RESTRICTED CONSTITUENTS

- Because F006 and F004 wastes have been identified in soils at the site, the Superfund site manager must meet alternate treatment levels established through a Treatability Variance for the BDAT constituents. These constituents are: Cadmium, Chromium, Lead, Nickel, Silver, and Cyanide for F006 and Creosols for F004.

#### AND DIVIDE THE CONSTITUENTS INTO THEIR STRUCTURAL/FUNCTIONAL GROUPS (see Highlight 2):

- All of the F006 constituents are in the Inorganics structural/functional group.
- Creosols are in the Other Polar Organic Compounds structural/functional group.
- In accordance with program goals, the preferred remedy also should result in the effective reduction (i.e., at least 90 percent) of all primary constituents of concern (i.e., Cadmium, Chromium, Lead, and Arsenic).

#### STEP 2: COMPARE THE CONCENTRATION THRESHOLD FOUND IN HIGHLIGHT 3 TO THE CONCENTRATIONS FOUND AT THE SITE AND CHOOSE EITHER THE CONCENTRATION LEVEL RANGE OR PERCENT REDUCTION RANGE FOR EACH RESTRICTED CONSTITUENT.

Constituent	Site Concentration	Threshold Concentration	Appropriate Range		Range to be achieved (compliance analysis)
			Concentration	Percent Reduction	
Cadmium	120 - 146 ppm	> 40 ppm		X	95-99.9 Percent Reduction (TCLP)
Chromium	30 - 56 ppm	< 120 ppm	X		0.5 - 6 ppm (TCLP)
Lead	2 - 12.5 ppm	< 300 ppm	X		0.1 - 3 ppm (TCLP)
Nickel	1 - 6.5 ppm	< 20 ppm	X		0.5 - 1 ppm (TCLP)
Creosols (Total)	50 - 600 ppm	> 100 ppm	X		90-99 Percent Reduction (TCLP)
Creosols (TCLP)	.25 - 4 ppm			X	
Arsenic	3 - 9 ppm	< 10 ppm	X		0.27 - 1 ppm (TCLP)

#### STEP 3: IDENTIFY TREATMENT TECHNOLOGIES THAT MEET THE TREATMENT RANGES.

- Highlight 3 lists the technologies that achieved the alternate treatment levels for each structural/functional group.
- Because creosols are present in relatively low concentrations (assumed for the purposes of this example), a TCLP may be used to determine if immobilization results in a sufficient reduction of mobility of this restricted RCRA hazardous waste. (Measures to address any volatilization of organics during immobilization processes will be necessary.)
- Based on the results of treatability tests conducted at the site, immobilization also will result in the effective reduction in leachability (i.e., at least 90 percent) of arsenic, a Superfund primary contaminant of concern.

Alternative	Effective Reduction of Toxicity, Mobility, Volume?	"Placement?"	Meet Treatability Variance Alternate Levels?
1. Low temperature stripping/immobilization	Yes	Yes	Yes
2. Immobilization in mobile unit	Yes	Yes	Yes
3. In-situ immobilization	Yes (Mobility)	No (LDRs not ARARs)	—
4. Capping in Place	No	No (LDRs not ARARs)	—

#### STEP 4: PREPARE PROPOSED PLAN, OBTAIN COMMENTS

- Highlight 4 provides sample language for the Proposed Plan that announces the intent to comply with the LDRs through a Treatability Variance.

#### STEP 5: PREPARE ROD

- Highlight 5 provides sample language for a ROD signed for a site that will comply with the LDRs through a Treatability Variance.

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## **ATTACHMENT C**

**Alabama and Nevada Notification Response Letters**

**AR305069**

# ADEM

## ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT



Fob James, Jr  
Governor

James W. Warr  
Acting Director  
XXXXXXXXXX  
XXXXXX

November 1, 1995

(334) 271-7700

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36109-2608

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36130-1463

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Sp Proj: 213-4399  
eld Ops: 272-8131  
ackup: 270-5612

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400 Well St. NE  
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(205) 353-1713  
FAX: 340-9359

2204 Perimeter Rd  
Mobile, AL  
36615-1131  
(334) 450-3400  
FAX: 479-2593

Dr. Jimmy Street  
Chemical Waste Management, Inc.  
P. O. Box 55  
Emelle, AL 35459-0055

Re: Treatability Variance  
Whitmoyer Superfund Site

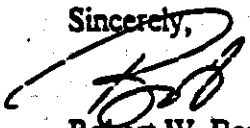
Dear Dr. Street,

Responding to your letter dated October 30, 1995 and with reference to our conversation at the CWM Emelle facility on October 26th, if the treatability variance which is currently being pursued by the Rohm and Haas Company for arsenic-contaminated soil at the Whitmoyer site is granted by EPA Region III, ADEM would accept that variance and allow the material to be disposed at the Emelle facility.

Of course, ADEM's concurrence is predicated upon EPA Region IV's acceptance of Region III's action. In previous conversations with Dr. Judy Sophianopoulos (Region IV) she has indicated that Region IV will accept a site-specific variance which is signed by the Regional Administrator. Therefore, and assuming Region IV's concurrence, the Alabama Department of Environmental Management will not object to the disposal of the subject waste within the terms of the treatability variance.

Should you have further questions please call me at 334/271-7741.

Sincerely,

  
Robert W. Barr, Chief  
Southern Section, RCB  
Land Division

RWB/cwmvar

cc: Dr. Paul Cichy  
Rohm and Haas

Dr. Judy Sophianopoulos  
EPA Region IV

File: Chem Waste/Sumter Co

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PETER G. MORROW, Director  
L.R. DODCHER, Administrator  
(702) 687-4570  
TDD 687-4578

Administration  
Mining Regulation and Reclamation  
Water Pollution Control  
Facilities 687-6992

Address Reply to:  
Capital Complex  
Carson City, NV 89701

STATE OF NEVADA  
BOB MILLER  
Governor



DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES  
DIVISION OF ENVIRONMENTAL PROTECTION

Capital Complex  
Carson City, Nevada 89710

Water Management  
Construction Affairs  
Pollution Facilities  
Facilities 687-6992

Air Quality  
Water Quality Planning  
Facilities 687-6992

Licensed with  
John W. New Lamb  
Carson City, NV 89710

October 4, 1991

DANA LOCKWOOD MANAGER  
ENVIRONMENTAL COMPLIANCE  
US ECOLOGY INC  
5333 WESTHEIMER SUITE 1000  
HOUSTON TX 77056-5407

RE: Remedial & Hazard - Treatability Variance for Arsenic (D004) Soils

Dear Mr. Lockwood:

This letter is provided per your request and discusses the Division's position in regards to LDR treatability variances for soils that would be managed in Nevada.

The Division does not have the authority to grant an LDR treatability variance as provided for by 40 CFR 268.44. This provision is reserved by the USEPA and was not adopted or delegated as part of Nevada's RCRA authorization. A generator wishing to obtain a LDR treatability variance should petition the Administrator of the United States Environmental Protection Agency or designee directly. Nevada would concurrently review the petition application and provide comments at the request of EPA or during the public comment opportunity when noticed in the Federal Register. In order for the Division's comments to be favorable, the petitioner must fully demonstrate that the physical or chemical properties of the waste differs significantly from the waste analyzed in developing the treatment standard or that the waste cannot be treated to specified levels or by the specified methods. Because the Division is assured that EPA will fully consider the Division's comments in this process, the Division will confidently accept the final decision by EPA to grant or deny a variance from a treatment standard.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jeffrey C. Denison".

Jeffrey C. Denison, P.E.  
RCRA Facilities Branch Supervisor  
Bureau of Waste Management

JCD:gt

AR305071